

York Teaching Hospital

Digital Strategy 2017 - 2022



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This Strategy has been developed at a time when the NHS and social care are facing unprecedented demand and significant financial and workforce challenges.

- The number of people over the age of 85 has increased by 1/3 since 2005 and is set to double in the next 20 years.
- 70% of inpatient bed days are occupied by people with long term conditions such as diabetes, COPD and the number continue to rise.
- Performance in relation to key indicators such as ED and Referral to Treatment Time are deteriorating.
- Two thirds of Trusts were in financial deficit in 2015/16 with the NHS having had 7 consecutive years of stringent cost improvement programmes.
- Most NHS organisations are reporting difficulties in recruiting and retaining staff.

In order for the NHS to continue to provide safe, effective health care at an affordable cost given all the challenges it faces it has to transform. This transformation will involve significant changes across every aspect including workforce; development; structure and how and where care is provided.

The Five Year Forward View published in 2014 set out ambitious goals for the NHS including “fully interoperable electronic health records so that patient’s records are paperless” by 2020. In 2016 the National Advisory Group on Health Information Technology in England recommended that this timeframe should be extended to 2023. Whilst there is some doubt over the exact date it is clear that the NHS will be unable to achieve its goals without digitising effectively. Whilst technology is undoubtedly only part of the equation it is one of the primary enablers.

York Trust is well placed to embrace this new and exciting digital age. It has invested in a world class industry standard infrastructure spanning the whole organisation; its clinicians are embracing technology and are integral to the development and implementation of systems to support them in providing safe effective healthcare.

The following themes flow through the Strategy:

- the consolidation and exploitation of existing investment;
- exploiting opportunities and transformation
- providing enhanced security for systems and information

These themes will support the achievement of Digital Strategy vision:

To be trusted to deliver, safe effective healthcare to our community supported by today's technologies future proofed for tomorrow's needs

This Digital Strategy and Vision will enable and support the Trust to achieve its ultimate objective "To be a valued and trusted partner within our care system delivering safe effective care to the population we serve."

York Teaching Hospital NHS Foundation Trust (the Trust) provides a comprehensive range of specialist acute and community healthcare services for approximately 800,000 people living in York, North and East Yorkshire and Ryedale – an area covering 3,400 square miles. It manages community-based services in Selby, York, Scarborough, and Ryedale, and delivers a wide range of acute and elective services in hospitals in Scarborough, York and Bridlington, as well as outpatient services across all of its localities. It has an annual turnover approaching £0.5bn, manages nine hospital sites and has a workforce of 8,500 staff working across hospitals and in the community.

2012-2017 IT Strategy

The previous Trust IT Strategy 2012-2017 concentrated on the IT requirements for the merger of York and Scarborough Trust. The main aims which have been achieved were:

- The deployment of a single electronic patient record (CPD) across the totality of the Trust replacing individual stand alone clinical applications.
- Single Network across the Local Health Community including a robust wireless network solution.
- The consolidation of back office systems and the key specialist clinical systems where appropriate to reduce the complexity of the application architecture.
- Adoption of collaboration technologies that provide medical and clinical practitioners as well as business staff with the ability to work with the same consistent experience wherever they may be, including in the mobile environment.

2017-2020

This strategy has been formulated at a pivotal time in the evolution of IT. The speed in which consumer technology has developed in recent years has led to huge tension between consumer expectations and what is possible in a business and health setting. Keeping up with this challenge means balancing the need to fully exploit existing investments in technology whilst being agile and innovative where it will solve a genuine problem for the Trust. This balance is made increasingly difficult by the ever changing landscape of health technology.

Digitisation, the streamlining and improving of business processes through the use of technology is gaining momentum across all industries. Despite having an in-house developed electronic patient record the Trust still relies heavily on solution providers to innovate in order to make digitisation a reality. As such, picking not only the right technology innovations but also the right time to adopt them has been a key consideration in developing this strategy.

In the coming years, millions of patients will undergo their first virtual care appointment, utilise their first wearable wellness app, and use their smartphones as a diagnostic tool. Approved medical devices connected by the Internet of Things (IoT) are already being used in hospitals to track and monitor patient status, at home to manage long-term conditions and medications, and in the clinic to support basic procedures.

Digitisation is a complex process that affects every relationship, piece of data, and interaction through the business and clinical pathways over time. It is not just about technology it is about changing the way in which care is delivered including place and time. In addition it gives significant opportunities in the way that we can utilise data collected at the point of care and support provision of care in new and innovative ways. Already with the data the Trust has the utilisation of Business Intelligent technology can do much more, offering enormous promise in big data and mass records analysis to help understand, address, and provide high-quality healthcare.

National Health Context

The Five Year Forward View published in 2014 makes a commitment that by 2020 there would be “fully interoperable electronic health records so that patient’s records are paperless”. This is turn was supported by a clear commitment in Personalised Health and Care 2020.

The National Information Board (NIB) in April 2016 published a document The Forward View Into Action: Paper-free at the Point of Care, Guidance for Developing Local Digital Roadmaps. The Local Digital Roadmaps are seen as a key foundation towards achieving Paper-free at the Point of Care. In addition to identifying local system-wide infrastructure elements NIB have identified 7 groups of capabilities underpinned by the need for robust information sharing agreements.

These capabilities are:

- Records, assessments and plans
- Transfers of care
- Order and results management
- Medicines management and optimization
- Decision Support
- Remote Care
- Asset and resource optimization

The Vision

To be trusted to deliver, safe effective healthcare to our community supported by today's technologies future proofed for tomorrow's needs

Core Principles

- Support the delivery of safe, evidence based, effective healthcare.
- Ensure that patients have access to information to help them make informed choices about their health care needs and lifestyle.
- Ensure that data is captured at the point of the event and that management, operational and commissioning information is a by-product of this.
- Ensure that clinicians and support staff have access to all the information they need to provide safe, evidence based, effective healthcare.
- Ensure the security, integrity and quality of the data. Ensuring that information is available in the right place at the right time to the right person.
- Exploit opportunities for collaborative working across all care settings. Providing adequate education, training, development and support to proactively manage the major changes in systems and processes.
- Develop, maintain and evaluate the quality and accessibility of information available to clinicians in all care settings.

- Develop and maintain the information flows across health and social care to ensure that strategic planning and operational management is based on good quality information.
- Exploit existing investment (people, process, applications and infrastructure).

The Trust's previous IT Strategy focused on the merger of Scarborough and York Trust by taking a holistic approach to IT investments. Its focus was on ensuring a common platform for clinical and business systems and on providing users the right information, at the right place and right time whilst bringing two separate organisations together. Investments have conformed to industry best practice, on-going training has been provided to staff and supportability has been maintained throughout.

This approach has resulted in the Trust having a robust platform for the future. To continue to remain current and secure, this strategy will exploit the following elements of the existing landscape:

<p>Electronic Patient Record (CPD)</p>	<p>This will remain in place throughout the period of the strategy and will continue to provide the core clinical application set primarily for Hospital Services. The ability to meet evolving clinical and business demands quickly, with ease and cost-effectively is of critical importance, ensuring the Trust remains ahead of national policy and its peers and achieves digitisation in the life time of this strategy.</p>
<p>Integration and Interoperability</p>	<p>Interoperability is the ability of different health information systems to 'talk to and work with each other' and share information. The systems involved need to be able to share information in such a way that each systems can make good use of it, in standard structured form. This poses technical challenges to system developers who have to agree to adopt consistent standards to enable meaningful information sharing to happen.</p> <p>The Trust has adopted HL7 the international standard which enables the transfer of healthcare data between systems. This has been used by the Trust for over 15 years to support internal interfaces between clinical systems, for example CPD to Laboratory or PACS systems, but also external systems such as the national electronic referrals system. This type of interfacing is mature and well established. In addition to integration within "secondary care" applications the Trust has adopted bespoke interoperability approaches to enable integration between Primary and Secondary Care eg the deployment of electronic requesting of Laboratory results; the launching of CPD within the Primary Care and Community</p>

	applications.
IT network infrastructure	Having undergone a recent refresh, the infrastructure is now providing excellent wired and wireless access for users and devices. This investment will undergo consideration around how it could support new demands such as patient and visitor network access, the increase of connected medical devices and sensors, and the convergence of building management services onto the network. Additional investment will be required to ensure sufficient security in light of an evolving threat landscape. The IT network infrastructure will reach the end of its investment cycle toward the latter stages of the strategy period and reinvestment will need to be considered.
End user technology	Investment within this area has ensured technology is readily available and fit for purpose. This has ensured users have reliable access to applications, particularly within clinical and increasingly community areas to ensure the adoption of paperlite.
SystemOne	Is currently deployed across Community Based Services and it is expected that this will continue to be the system of choice throughout the life of this strategy.
Collaboration platform	Having been established for more than 15 years, the collaboration platform will continue to provide core voice, video and messaging services. There is opportunity to optimise this investment by extending capabilities into the community and to patients, delivering a better collaborative experience for all.
Strategic Technology Vendors	The selection of a small number of vendors has enabled the Trust to gain advanced and dependable support of the underlying infrastructure. This supports continued innovation through increased focus on uncovering new ways to work with minimal financial risk.
Governance & management	Robust processes have been implemented to ensure secure management of the IT estate. This has enabled reliable and controlled management of change, whilst supporting continuous improvement and maximizing investment lifecycles.

The world of technology continues to evolve at pace and many of these developments not only impact industry but also healthcare.

- **User Experience:** The advancement and proliferation of IT into our consumer lives has come with expectancy that at work IT should be quick, easier to use and work effectively.

Impact on the Trust: This presents challenges within the NHS where applications are great in number, complex, legally require stringent security due to the sensitivity of data and as a result have longer investment cycles. The Trust is in a better place than most given its primary clinical application CPD is provided in house and is an integrated solution. This enables a flexible and agile response to clinical and organisational needs.

However, there remains a continual balance between the need for new IT services and maintaining security with the limited resources available to ensure business priorities are met. Community integration will also mean a wider variety of users all expecting a consistent experience as they move between locations.

- **Continued drive towards 'mobility':** In general, consumer IT habits have become more mobile through the adoption of technologies such as smart phones and tablets, the provision of good connectivity via 4G and WiFi, and an explosion of supporting applications. These technologies and mindset have resulted in technology providers meeting these mobile expectations within and outside the enterprise.

Impact on the Trust: NHS staff have a need to access or update information and collaborate as they move around within hospitals, across the community, potentially work from home or on the move. Mobile and tablet devices have proven difficult to use in providing a clinical or patient view and access to their information. However, the Trust will continue to leverage CPD and SystmOne to deliver the right information, at the right place at the right time. A good example being email on smart phones and web delivered electronic observations for workstations on wheels as well as the deployment of laptops for Community Nurses.

- **Increased collaboration:** Collaboration technologies continue to mature and evolve. Technology advancements enable easier to use interfaces beyond hard phones to integrated voice and video messaging, conferencing and document sharing experiences

onto smart phones, tablets and web browsers. In general, this has improved collaboration for users and enabled them to have a richer experience even if they are not sat at their desk or within the same organisation.

Impact on the Trust: The ability to easily collaborate within the health economy and with patients will have a significant impact to clinical outcomes and the patient experience - a good example is the adoption of Cancer MDTs. The Trust has already invested in Cisco, a health focused strategic vendor, and it will continue to evolve and explore new use cases as this technology advances to collaboration across teams, locations and with patients. For example, the Trust will explore using its collaboration capability to provide remote patient consultations.

- **Cloud Maturity:** Cloud computing, often referred to as 'cloud' is the delivery of on-demand computing resources that provide everything from applications to data centres on a pay per use basis. The market and service offerings have matured within defined segments such as Software-as-a-Service (SaaS), private cloud and public cloud. Such developments are matched by the increasing availability of Hybrid IT services which can enable the best of both worlds.

Impact on the Trust: The NHS is beginning to use cloud services mainly as SaaS. Recent developments have meant public cloud services can now realistically begin to be considered. The Trust will continue to review how it provides computing services to support its applications on a case by case basis as additional investment is required or opportunities arise.

- **Internet of Things (IoT):** The next generation of the Internet will eventually see an increasing number of "things" such as appliances, vehicles, buildings and other devices – embedded with electronics, software, sensors becoming connected enabling objects to collect and exchange data. This is an emerging technology area that is expected to mature during the term of the strategy and enable organisations to exploit the wealth of information. It will undoubtedly bring many benefits but it will also increase the risk of cyber-attack.

Impact on the Trust: Within the NHS there is a general shift towards medical devices and equipment being network connected and feeding data and information to central systems. The Trust is increasingly being requested to connect its medical devices to its

network e.g. ECG machines and ophthalmology diagnostic. This is presenting an increasing security and operational challenge for the Trust to overcome and solutions to address this will be invested in, as appropriate

- **Automation:** Technology vendors are increasingly providing network and data centre infrastructure that can be automated in its deployment and operations.

Impact on the Trust: Automation has the potential to decrease the time and cost to deploy and operate network and Data Centre infrastructures and to minimize human errors through configuration. Investment in these technologies will enable the Trust to meet the increased demands of digitization and IoT devices using the same staffing levels.

- **Data and Analytics:** Organisations are becoming increasingly aware of the value of data that they hold. Exploiting this data in new and innovative ways is now common across a wide range of commerce and industry and has been a significant area of development over the last few years.

Impact on the Trust: The NHS nationally is already benefitting from data analytics and machine learning techniques. Having good quality historical data our Trust is ideally placed to investigate and exploit these technologies to improve health outcomes and the effectiveness and efficiency of patient care pathways.

Hospital Electronic Patient Record

The strategic solution for the electronic patient record for hospital activity will continue to be CPD. CPD will continue to be the Master Patient Index for the organisation and the "hub" in relation to integration with other systems such as Pathology, Pharmacy and PACS. Development of CPD will continue to meet the strategic aims of the Trust and the wider NHS. In particular the emphasis will be on meeting the requirements of the five year forward view published in 2014 with its objective to make sure patient records are digital and interoperable by 2020.

Community Electronic Patient Record

The chosen solution for community based activity is SystmOne supplied by TPP. Notwithstanding any unforeseen commercial or contractual issues emerging, it is not expected that this will change during the term of this strategy. As SystmOne is a commercial product, the Trust has no control over its future development however, the terms of GP System of Choice have driven the interoperability agenda and we will fully exploit new capabilities of SystmOne as and when they become available. This will support paper-light working within community, better information sharing between GP and Community Nursing and Allied Health Professional services. It will potentially support new ways of working and managing patient care.

The capabilities of SystmOne will be fully exploited in relation to Mobile working, paperless care planning and treatment records, and the general management of activity.

Significant Developments

In relation to CPD the primary focus is on the development of applications to support the delivery of safe effective healthcare by working in partnership with clinical teams. The secondary focus continues to be the need to meet the continual changing national agenda in relation to for example Cancer, Minimum Datasets and changes in commissioning rules as well as any operational requirements.

The key strategic developments will focus on:

- Delivering a digital health record by
 - Ensuring full compliance of the 7 capabilities required as part of the Local Digital Roadmap.

- Reducing the reliance on the need to record clinical care on paper
 - Further roll out of scanning paper records where paper continues to exist or is the most appropriate method for recording care.
 - Where possible and appropriate capture information directly from medical devices for example ECGs
- Ensuring that standards published by NHS Digital are adhered to. This will facilitate opportunities in relation to interoperability particularly with Primary Care, Community Services and Social Care.
 - Exploring the possibilities of a Patient Portal where patients can safely and securely access their own health record.

In relation to reporting and data analytics the focus will be on:

- Consolidation and exploitation of the data warehouse which will bring together data from applications such as SystemOne and CPD enabling the exploration and exploitation of Predictive Analytics.
- The automation of reporting wherever possible to improve the efficiency of reporting systems and teams.
- The deployment of business intelligence tools directly to users with the expectation that appropriate training and education they will be able to be self-sufficient for many of their adhoc reporting requirements.

Pathology

The laboratory information System will need to be replaced in the life time of this strategy. In order to realise efficiencies it is expected that this will be a joint procurement with other Laboratory Service Providers.

Radiology

Currently Radiology is part of the integrated electronic patient record (CPD) a review will be undertaken to agree the most appropriate way to reduce paper flows and increase efficiencies. This may require the purchase of a dedicated radiology information system.

PACS

Work will continue in partnership with the incumbent supplier Carestream to fully exploit the current functionality and to extend the storage of images etc. created by other non-radiology specialties. This will increase the content of the digital health record.

Introduction

With circa 8,000 users and over 6,000 devices, the Trust provides access to technology for a wide range of user and departmental needs. A core principle of providing IT services is to enable staff access to the right information at the right time in the right place on the right device whilst ensuring the security of patient information and confidential corporate information. This principle is seen most prevalently within the end user access domain, with the applications and devices provided to staff directly impacting upon service delivery and operational efficiency.

Future Vision

One of the greatest challenges within end user access is the speed in which consumer technology has developed in recent years, leading to tensions between consumer expectations and what is possible in a business and health setting. In developing this strategy and working with technology partners a number of options have been explored and emphasis placed on ease of use. The result of this analysis has shown that technologies such as virtual desktop infrastructure do not give the Trust a viable return on investment.

Regardless of where the care is delivered, be it in the community or acute setting, as the Trust moves towards digitisation it is clear that there is a dependency on a device that has an inbuilt keyboard and long battery life. Given today's technology this means that in most clinical settings the device of choice will continue to be a desktop PC or laptop, as tablets currently do not provide an equivalent experience and currently features such as voice recognition at an enterprise level are cost prohibitive.

Ultimately the question we have to ask in relation to end user devices is not what technology can we use but - What is the problem that we are trying to solve or the opportunity we are trying to exploit; what access do clinicians require quicker than they can currently get?

Productivity Tools

Microsoft Office products are the market leader in productivity tools but come at a significant cost to an organisation. In order to reduce costs, the strategic aim is to continue to reduce the overall requirement for Microsoft products by identifying areas where an

alternative is available that will not negatively impact productivity or usability. Pre-empting this has seen the Trust already remove the dependency that the electronic patient record had on Microsoft Office Products.

These steps now provide a unique opportunity for the Trust to:

- Evaluate low cost alternatives to Microsoft Office, including OpenSource options with a clear decision sought by the end of 2017 as to possible reduction of its use.
- Formally assess the feasibility of running CPD on alternative devices and operating systems, such as Linux to realise significant Microsoft licensing and PC-refresh cost savings. This will in addition reduce a potential single point of failure if we were to deploy more than one operating system.

File Sharing

The Trust is actively moving towards the digitisation of clinical documentation and medical images, strategic document management considerations are therefore limited to general user files. There is currently in place the ability to share documents across directorates and the Trust and whilst there are specific document management systems available for this purpose, these are at a significant cost and require major cultural changes and organisational transformation which is not seen as a current strategic priority. The strategy will be to:

- Make it easier for staff to access, collaborate and update documents
- Provide secure access to files and promote collaboration across teams and locations when it is needed.

Email

Currently Email services are based on Exchange 2010 and are hosted and managed on-premise, with this version of Exchange supported until January 2020. As a mature and reliable platform, the strategic intent is to further leverage current investments whilst continually reviewing the benefits to the Trust of moving to NHS Mail 2, an NHS wide mail solution currently utilised only when emailing documents containing person identifiable data.

The Trust will need to take into account the need to move to an ISB accredited mail environment during 2017.

End User Devices

The Trust currently maintain a rolling refresh programme each year which sees the oldest PCs replaced for new, with priority on PCs in clinical areas, as is industry best practice. This is currently a significant financial overhead and the main item of spend within the IT Capital Programme. In conjunction with 3rd party partners a number of options have been explored including the Virtual Desktop Infrastructure, but these offer no realistic return on investment. Therefore the Trust's strategy in relation to end users devices will be:

- The continual appraisal of new technologies as they are released on to the market to ensure that the most cost effective end user device is deployed.
- To develop a more pragmatic approach to PC refresh based on the actual utilisation of equipment rather than just age.
- To investigate the deployment of Linux Operating Systems in areas where PCs are not heavily utilised (such as ward lists) and to provide additional contingency with the provision of a "mixed" desktop environment.
- The optimisation of speed of access to any application.

Printing

The aim of previous strategies has been to reduce cost through the optimization and removal of colour devices and single use printers, faxes and photocopiers across the estate. This has been very successful within the York locality, with colour output reduced to less than 1.6% of total printing and a significant reduction in the total number of devices. Processes have been introduced that limit the ordering of printing supplies and reduced consumption has been realised by enforcing duplexing on printers that support it.

The strategy in relation to printing is to:

- Ensure centralised configuration and management of a whole Trust printing environment.
- Ensure a replication of the strategy already deployed across the York locality with an expectation that device numbers will reduce by a third.
- Consolidate the print service into a single managed print contract, including deploying multi-function devices.

- Where ever possible increase digitalised processes to improve efficiency and reduce paper and the need for on-going storage of paper.

Introduction

The Trust was amongst the first in the NHS to invest in an approach to collaboration based on digital technology over fifteen years ago. This investment has proven to be a shrewd decision, with many other organisations and NHS Trusts still 'catching up' and now being faced with an enforced replacement of their aging analogue systems as vendors remove support for them from the market. More importantly, the investment has been exceptionally successful as it has provided a single, common collaboration platform that has been, and continues to be, exploited for multiple uses cases. The quick extension of the platform to Scarborough is a good example of that.

Voice, video and collaboration technologies have the potential to directly impact on service delivery and operational efficiency. The strategic priority is to continue to invest in this collaboration platform to maximise the value it delivers to users.

Future Vision

The advanced state of the current collaboration platform provides a great opportunity to further exploit this asset in two distinct ways:

- Looking inwards – to drive internal efficiencies, remove delays in communication and increase the quality of care
- Looking outwards - to improve engagement with patients, health and social care partners and the third sector

A particular focus will be placed on removing delays in communications which impact care, enabling the right information or clinical capability to be available at the right place and the right time.

Also worthy of note is that, as with any change program, cultural changes will be key in affecting change. The technology to enable change is already available and will continue to evolve, the biggest challenge will be educating, enabling and engaging people to ensure changes in working practices are embraced and therefore provide the anticipated service improvements.

Looking Inwards – Driving Efficiencies

The strategy is to continue to increase the use of video across the Trust to become more sustainable, reducing the need to travel between sites for routine meetings and freeing up time to be used elsewhere.

The exploitation of existing collaboration tools will enable better interaction between teams and will support virtual teams both within site and across sites. The ability for teams to easily communicate will enable better co-ordination, particularly when complex medical conditions or events happen within the hospital environment.

Looking Outwards – Patient engagement

The strategy will facilitate improved patient experience by utilising the current internal collaboration platform. Examples of this approach could be as follows:

- Video consultation between the patient, relative and/or carer and the clinician
- Create a Single Point of Contact which offers different contact mechanisms to more effectively direct patients and relatives to the appropriate person or service when contacting the Trust

Looking Outwards – Partner Organisations

The Trust will look to utilise the robust collaboration platform already in place to enable working closer with other healthcare and social partners. Examples of this approach could be as follows:

- Extending the adoption of video to users desktops to provide the capability to share both video and content when participating in patient consultations, training and MDTs.
- Improving interaction between primary and secondary care by offering enhanced support and specialist advice.
- The opportunity to use video in emergency cases through interaction between the ambulance services and the emergency department, as already happens in the treatment of stroke.

Introduction

Enterprise Networking consists of the underlying infrastructure that is largely invisible to the user but is perhaps the most critical element. Like the foundations of a hospital, the Enterprise Network must be robust, scalable and high performing. Enterprise Networking includes:

- Networks for the campus environment (hospitals, offices, clinics etc.);
- Wide area network connections between sites;
- Mobility, i.e. wireless networks and associated features;
- Network management tools.

Future Vision

The Trust has made significant investments over a number of years in a robust, enterprise class network infrastructure based on Cisco technologies. Due to this level of investment the Trust now has in place a best in class network infrastructure which will not require a large scale refresh throughout the life of this strategy. Therefore the Strategy for Enterprise Networking is focused on optimisation, exploitation and enhancing the security of the current infrastructure.

Introduction

The world is becoming a more connected place and whilst these can and will bring many advantages it does by its very nature bring new threats. Globally there is an alarming rise in cyber threats and attacks with attackers adapting at a faster pace than organisations can respond to, and NHS organisations are not immune. The mitigation of risks such as ransomware, lack of user awareness and unauthorised network access from unknown or "Bring Your Own Devices" means that Cyber Security must now be considered as an essential part of every solution spanning all areas of technology.

Traditionally there has been a heavy reliance on stopping an attack getting onto the network by using multiple products from multiple vendors. However, it is now recognised globally that there is no full-proof method of being 100% secure and protected against all cyber threats. As a result of this the Trust's approach is to minimise the risk of threats with preventative measures whilst planning to reduce the impact when the threat does breach the network perimeter.

Future Vision

The Trust has invested heavily in technologies for its networking and server infrastructure, and therefore will exploit and maximise this investment to provide this holistic approach.

Noting the factors above, the Trust's strategy in relation to Cyber Security will focus on:

1. **Perimeter Security** - to provide the enhanced protection from cyber threats
2. **End to End Security** - The strategic investment made in the network infrastructure will be utilised to maintain a high level of network integrity and stop untrusted or unauthorised devices from connecting to the internal network and potentially spreading malware or accessing confidential data.
3. **Security Analytics** - Analysis and baseline of normal network and user activity will be undertaken by leveraging the modern, end to end infrastructure already in place. In the event of a malware outbreak or malicious activity, this can quickly be flagged as abnormal traffic behaviour and appropriate and timely action be taken to prevent further proliferation.

4. **Email Security** – The current solution will be evaluated at the point of renewal to continue to best protect against a weekly average of 4,000 malware or virus infected and 10,000 spam emails (as of November 2016).
5. **User Awareness** – The National Data Guardian review reported that many security breaches across the health and care environment were not caused by malicious external attackers. They were in fact a result of actions by employees who found work-arounds for what they perceived to be ineffective technology or processes. Although currently information governance training is mandated, more emphasis will be given to educating users on the role that they play in minimizing cyber security breaches. In addition to ensuring security is considered as an integral part of the development of business and clinical systems.
6. **Endpoint Protection** - A robust endpoint protection solution will be maintained at all times.
7. **Online external access to Trust Applications** – With a number of services available externally, no single approach fits all. However, the key principle that will be adopted is that individuals will only have access to the services they require, i.e. the principle of least privilege. All network traffic will be secure and encrypted.
8. **Legacy Application Support** – Software patching reduces the exposure to malicious software and can reduce the potential for an attacker to get a foot hold in the network. Effective patching is becoming harder as the number of network devices and applications increases and when dealing with legacy systems where patches are not available or where patching renders the system unsupported by vendors.

Introduction

The Trust's data centre infrastructure is deployed across two locations at the York Hospital site, with a third data centre location at Scarborough hospital. Robust technologies from main stream vendors have been utilised over the proceeding five years to create a reliable and high performance platform for business and clinical applications.

The future strategy will now capitalise on the significant opportunities that exist for data centre optimisation and improvement, brought about by the organic nature of data centre growth coupled with technology developments. The most notable of these developments is the continuing trend towards automating management of data centre and networking technologies, and managing them as a single entity. As such, the data centre strategy will look to deliver increased returns on the investments made to date by establishing a platform which is 'automation ready'.

Future Vision

Converged Infrastructure

The drive towards becoming 'automation ready' dictates the Trust, wherever possible and appropriate, will standardise on a single, strategic converged infrastructure encompassing compatible server, storage and networking across both York and Scarborough data centres.

Virtualisation

To gain maximum benefits of a virtual infrastructure and make best use of the converged infrastructure investments, the virtualisation platforms strategy is to:

- Exploit the investment already made in VMWare, with no significant refresh during the 5-year strategy
- Virtualise Oracle applications (where possible) using Oracle Virtual Machine (OVM) onto the strategic converged infrastructure platform

High Availability

Increased dependence on a larger number of key applications means there will be more focus and investment in providing high availability within York going forward. The goal of this investment will be to meet the following objectives:

- 'Highly available' should mean the application is useable by the appropriate end users for 99.98% of the time
- Highly available applications should have a recovery point objective (RPO), meaning the amount of data lost in the event of a data restoration, of 15 minutes
- Key applications to be made highly available being CPD, Pathology, PACS, Pharmacy, ICE & Keystone, Telephony, Email and supporting services, such as VMWare & Active Directory

Disaster Recovery

Under the previous strategy, 'true' Disaster Recovery at a secondary facilitate (most likely Scarborough) was not deemed feasible due to connectivity not being cost effective and the impact of a catastrophic event at the main York site having further reaching implications over and above IT systems. This continues to be the strategic intent and therefore there will be no significant investment in DR capability during the 5-year strategy period.

The strategy will look to drive further efficiency and reliability in systems backups through the following activities:

- 1) Continue to remove any remaining tape backups when feasible to do so
- 2) Look to leverage investments made in VMWare and alternative storage platforms to ensure backup solution is fit for purpose for modern virtualised environments
- 3) Investigate possibilities of storing additional copies of system backups offsite within new Trust facilities

Cloud

Alternative ways of consuming technology, such as Cloud services, will continue to be prevalent over the 5-year strategy period. Whilst not significantly utilised by the Trust at present, when making the specific technology decisions highlighted throughout this document, appropriate Cloud alternatives will also be reviewed and the guiding principles utilised to select the most suitable option.